An

Inaugural Essay

on the

Modus Operandi of Cold

Submitted to the Examination

of the Provost Medical Professors

and Trustees of the

University of Pennsylvania

for the Degree of Doctor of Medicine

By

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of Lexington Kentucky

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Of the Modus Operandi of Cold.

In Whatever point of View we consider the Subject of Cold its importance equally claims our attention. To the Philosopher it is deeply interesting, since its various and complicated effects are daily presented to his view; and to the Practitioner of Medicine a correct Knowledge of its operation is of the greatest importance because it has become a very common and frequently by a proper application a very powerfull and successful remedy in the cure of disease.

With respect to the operation of Cold we may say that only one of two Opinions can be true either that it is a Stimulus infusing new and additional excitement into a part in the same manner as other stimuli.

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y of a debilitating nature by abstracting a portion of the standard heat of the body. The latter opinion I shall adopt and endeavour to prove—

When it is considered that so many learned Physicians and Philosophers have spent long and laborious lives in the investigation of Medical Science, and in their Researches have left no stone untumed, no path unexplored; any new facts or ideas will scarcely be expected from one, who is just with trembling, and uncertain steps, entering the threshold of the temple of Medicine. But as the laws of the University render it necessary for obtaining a Medical degree that the Candidate should produce an essay on some Medical Subject I cannot forbear soliciting indulgence for the imperfect performance of a task imposed upon me and undertaken with much anxiety and apprehension— The variety of subjects which necessarily occupies the attention of a student prevents him paying

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that exclusive attention to any single subject as will enable him to elucidate what was before obscure or to throw many new lights upon what was already known. To Collect and arrange the facts of others shall be the object of this essay and I exceedingly regret that the short time to which I am restricted will not admit of my doing that justice to the subject which its importance merits - To Professor Rush whose expanded genius has so ably investigated and whose instructive pen has so amply delineated this subject I am indebted for many of the facts and observations contained in this essay -

That Cold is a Sedative I infer 1st From its diminishing the action of the heart and arteries in the same manner as Venæ Section rest low diet &c 2nd From the debility and inactivity of the inhabitants of Cold Countries and the uniform slowness of their pulse as in Greenland seldom beating above forty strokes in a minute - These effects become

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evident in proportion as we advance to the frozen regions which encircle the pole. All Travellers who have penetrated into those inhospitable Climes have given us a corresponding account of the torpid and feebly animated existence of their inhabitants - This debilitating effect has been extended by Mr Ferguson and Wilson to the faculties and operations of the mind accusing them of imbecillity stupidity and Cowardice -

I infer 3dly Cold to be a Sedative from the paleness of the skin succeeding its first application and Lastly I infer it from the nature of the diseases in which it has been used -

That Cold reduces the force, fulness and frequency of the pulse has been correctly ascertained by numerous and well attested experiments; some of which I shall take the liberty of inserting - Dr Rush in his Lectures relates the experiment performed by one of his Pupils under his inspection, by placing the feet in cold pump water for a few minutes

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his pulse was reduced twenty four strokes in a minute and became so weak as scarcely to be perceptible –

For some very interesting experiments on this subject we are indebted to Dr Stock of Bristol; a detail of them would be unnecessary, but the result was, in those cases where the subject of the experiment was exposed to cold without exercise, the pulse was reduced in force and frequency and in every instance even when muscular exertion had been made previous to the and during the immersion the pulse was reduced in force and fulness –

But from our Countryman Doctr Klapp here we received the most unequivocal and decisive experiments that have been made on the operation of Cold. The first experiment went to confirm the one related from Dr Rush – the pulse previous to the immersion, beat 74 pulsations in a minute. natural as to quickness and fulness. in two minutes the pulse beat 63 in a minute – in three minutes 62, in 4 minutes 62, in 6 minutes

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the pulse beat 64 per minute and seven minutes from the immersion it afforded 69 pulsations. The pulse not only became less frequent but lost much of its force & fulness. In the second experiment the legs and feet were immersed in snow, in two minutes the pulse became very weak and fell in frequency from 74 pulsations to 58 in a minute. In both the above experiments after the immersion had been discontinued for the compass of a few minutes the pulse assumed something more than its usual force and frequency. In the third experiment the subject was exposed to an atmosphere which sunk the Mercury of the Thermometer to the Freezing point. On examining the pulse in 15 minutes after the exposure, it had lost much of its force and fulness and was diminished in frequency from 76 to 60 pulsations a minute. In reply to the various proofs which have from many quarters been obtained of the power of a high degree of cold to diminish the force and frequency of the pulse, it has been asserted that such evidence is not conclusive, since the fact is only

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true with regard to high degrees of Cold, and that a moderate degree of it invigorates the blood vessels, muscles and any other part of the system - To refute this opinion the following experiment was instituted. The subject was exposed to an atmosphere of 40 degrees of Fah.t pulse as to force and fulness usual, beating sixty eight strokes in a minute; in 12 minutes pulse beat 58 feeble strokes in a minute in 14 minutes it beat fifty six strokes, in 15 minutes it was 56, and in 17 minutes it emitted 56 weak strokes in a minute - another experiment was instituted with similar effects. the pulse beating 70 regular and usually full strokes in a minute; the person was exposed to an atmosphere at the temperature of 50° of Fahrenheit and at the expiration of 19 minutes the pulse beat 59 pulsations in a minute, from the commencement to the termination of the experiment the pulse was sensibly diminished in force and fulness - The foregoing experiments prove that the primary effect of Cold is to lessen the force, fulness and frequency of the pulse - and I think the

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Sedative effects of Cold are perhaps demonstrated in no way more satisfactorily than in the mode of continued exposure to cold without exercise, as was the case in several of the experiments of Dr Klapp -

In the foregoing experiments however it may be replied that in admitting cold diminishes arterial action, it does not follow necessarily that it is a Sedative; for Opium Digitalis &c have the same effect. This is most unquestionably incorrect; form the idea arose from an imperfect knowledge of the modus operandi of those articles. The experiments of Professor Fenton and Dr Moore prove, that Digitalis is ~~primarily~~ primarily a stimulus, and its reducing the pulse is a secondary effect - and I believe no one at this day doubts of the stimulating operation of Opium --

That Cold is a Sedative, I inferred from the paleness of the Skin upon its first application - This is produced by a contraction of the Superficial vessels: by which means the blood is prevented from circulating thro them - If the Cold be

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considerable, the effect is particularly evident - But it may be urged, that Stimuli are necessary to induce this contraction - The Penis is kept distended by a due quantity of blood circulating in the extreme capillaries; reduce their action in any manner, or prevent a due quantity of blood from circulating and contraction ensues. Some Section will produce it, and who will assert its stimulating operation - The distention of the Penis depends upon a quantity of blood being propelled to that organ; abstract that blood and the erection ceases; this may be done either by Fear or Cold water - The Scrotum, while under the influence of fear, assumes the same corrugated appearance as by the application of Cold: and will any one seriously assert that in either of the above cases fear acts as a stimulus? again, we see such very opposite effects from the application of Cold and heat to the scrotum the former producing contraction, the other relaxation; we must infer that their mode of operating are very different - All men agree that heat is a stimulus, cold being the abstraction, must be a Sedative - ~~Lastly~~ I infer the Sedative operation of Cold from the nature of the diseases in which it has been used, even by those who

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is obvious, that its application would be strongly indicated
the Cold stage of an Intermittent, and not at its exercebation
which time Currie prescribes it. But experience would
n convince us of the error of the Theory, were we, under
ch circumstances to apply the remedy. Let us hear what
s the result of Dr Curries experience; upon applying cold in
e protraction of a chilly fit beyond the usual period. "The
the patients breathing was almost suspended, his pulse at
e wrist was not to be felt, the pulsations of his heart were
ible, and fluttering, a deadly coldness spread over the
rface, and when respiration returned, it was short, irregular,
nd laborious". In the low state of Fever generally called
phus, says Dr Currie it is improper to use cold, when the
at measured by the thermometer, is less than, or even only
qual, to the natural heat, tho the patient should feel
o degree of Chillness; and where the patient is ~~not~~ too weak,
the vital energy seemed too much exhausted to
stain the impression of so powerfull a stimulus —

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as to the propriety of the foregoing directions I shall not
dispute; but if cold is a stimulus, then practice has certainly
been improper; for who would withold or doubt of the
propriety of using stimuli in all the above instances, in
which cold is forbidden—

But it has been asked in what manner does cold air
act in removing the debility occasioned by heat? I answer
it abstracts a portion of the stimulus of heat, and accumu-
lates excitability, or an increased sensibility to the stimulus of
heat— hence the glow upon the skin after immersion from a
cold bath, when properly used— This fact did not escape the
great Father of Medicine Hippocrates; for he observes "that those
who journey thro snow or any other great cold are chilled very much
either in their feet, or their hands, or their head, suffer greatly at
night, when they are covered up warm, with a burning and tingling
and some are even affected with blisters, as if they were burnt by
fire". It is from this increased sensibility to Cold and its
effect that has induced the belief that cold has a tonic and
stimulant operation— "If Cold, observes Dr Brown, sometimes

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ld, but either as diminishing excessive heat, and reducing it to
proper stimulant temperature, or by accumulating the
citability diminished by excessive stimulus, and communicating
ergy to the stimulus of the exciting powers, now acting too
ngudly" — Heat, long and constantly applied, produces
pression as readily as miasmata - and cold restores health in
e one case just in the same manner that bloodletting does
the other; and the same arguments that have been adduced
prove the stimulating agency of cold in communicating
ergy to the system, might with equal force and propriety,
applied to establish the exciting powers of venaesection —
he Pain induced by cold has been urged as a proof of
stimulating qualities - But this is the effect of contraction
om a closer union of the solid parts by the abstraction of heat,
which means the nerves are suddenly compressed - Irregular
ction and consequent pain are certain consequences of the improper
ctraction of stimuli - An effect similar to that of Cold is

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compressed — so speedily
Error lurks in Inflammation

duced by pressure with the hand.

again, the redness and apparent enlargement of the vessels of the skin, have been adduced as a proof of cold being a stimulus. formerly observed that the first effect of the application of Cold is paleness, and a greater degree of it relaxes the vessels and the red globules of the blood are now admitted into vessels, which previously refused its admission; and being unable to propel them back again, a stagnation ensues and a still greater degree of cold causes a dark colour and Gangrene -

It has been said, that the cold shower bath is a stimulus - By its force and weight it may stimulate the part to which it is immediately applied - upon the same principle I account for the efficacy of sprinkling water in some cases of asphyxia, where the skin becomes extremely sensible to the most feeble stimuli - or in some cases, the natural heat of the face and extremities may be so much diminished that the temperature of common pump or spring water may be slightly stimulating -

A Draught of Cold water often induces sweating - antimoniated tartrate of Potash, Spirits Nitre, Clarcis, and warm water, which are

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unquestionably stimuli produce the same effect. Cold water induces sweat only in inflammatory diseases when the capillary vessels of the skin transcend the secreting point and from the great sympathy between the stomach and skin the cold drink taken into the stomach reduces its action and consequently that of the skin to the sweating point.

Another argument in favour of the stimulating operation of Cold is the appearance of the skin called Cutis anserina. May not this be the natural appearance of the skin and made to appear the smooth by exposure to heat & owing to a contraction of the skin leaving the ends of the vessels exposed.

Cold has been said to be the exciting cause of Fever, and thus inferred a stimulus. It may induce fever, 1st by checking perspiration and 2dly by suddenly destroying the equilibrium of the system. The human frame is capable of bearing great varieties of heat and cold, if time be given to accomodate itself to those different states. All the mischief is done from the sudden transition of one state to the other.

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We see Fevers and other convulsive diseases from bloodletting and the application of Fear and their stimulant operation has not been advanced by any one –

From the preceeding facts I think we may unequivocally assert that the primary effect of cold is that of Sedative –

I cannot conclude this very imperfect essay without thus expressing my gratitude for the benefit I have derived from your instruction during my attendance upon your Lectures; and my most ardent wish is, that your attempts to alleviate the sufferings of Mankind may be crowned with that success, which your able talents, and unwearied exertions so justly merit —